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Supporting Dialogic Literacy Through Mashing and Modding of Places and Spaces

Technology-dependent teaching strategies can exploit the currently underused capacities of media-rich Web 2.0 technology to enable student engagement and support higher order thinking. In particular, Web 2.0 technologies support learners' opportunities to construct and coconstruct ideas/knowledge and ways in which they can add their own interpretations into Web 2.0 tools that enable modding of existing products and collation of multimodal information from multiple sources through mashing.

Mashing—A mash up is a website or web application that seamlessly combines content from more than one source into an integrated experience. (Wikipedia: http://en.wikipedia.org/wiki/Mashup_%28web_application_hybrid%29)

Modding—Modding is a slang expression for the act of modifying a piece of hardware or software to perform a function not intended by someone with legal rights concerning that modification. (Wikipedia: <http://en.wikipedia.org/wiki/Modding>)

Dialogic Literacy

THE PROPERTIES OF GROUPS of minds in interaction with each other, or the properties of the interaction between individual minds and artefacts in the world, are frequently at the heart of intelligent human performance (Hutchins, 1993, p. 62).

We live in a world that is becoming more networked and the Internet has grown into an

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essential medium for communication, socialization, and creative expression. Virtual worlds like *Second Life* may represent the future of human interaction in such a globally networked world, and students who have grown up with the Internet naturally swim in these waters. These *digital natives* (Prensky, 2001) eagerly embrace social software such as instant messaging, social networking spaces, and massively multiplayer online games. And as the students of today grow into the leaders of tomorrow, they will bring these technologies into the workplace, making their use an essential part of the future of work and business. Research on digital literacies (Hobbs, 2004; Livingstone, 2004) shows that there is a range of perspectives on which aspects of the use of media are essential to notions of literacy, ranging from a critical consumption to being able to use the tools for production.

In education we are increasingly witnessing a growing emphasis on the need to support learners not only to acquire knowledge and information, but also to develop the resources and skills necessary to engage with social and technical change, and to continue learning throughout the rest of their lives. Bereiter and Scardamalia (2005) suggest the use of the term *dialogic literacy* “as the ability to engage productively in discourse whose purpose is to generate new knowledge and understanding” (p. 11), in contrast to *functional literacy*, which refers to the ability to comprehend and use communication media to serve the purposes of everyday life. Dialogic literacy is, thus, a fundamental literacy for a knowledge society. As Bereiter and Scardamalia (2005) note:

In every kind of knowledge-based, progressive organization, new knowledge and new directions are forged through dialogue.... The dialogue in Knowledge Age organizations is not principally concerned with narrative, exposition, argument, and persuasion (the stand-bys of traditional rhetoric) but with solving problems and developing new ideas.... Higher-order Knowledge Age skills have to do with collaboration, initiative, communication, and creativity. (pp. 16–18)

This concept is not tied to any particular representational medium, so long as the medium is one through which learners can interactively build their knowledge. Increasingly the forms of communication employ a range of modal representations in a multiplicity of hybrid forms drawing on semiotic resources such as words, shapes, colors, lines, space, textures, sounds, light, movement and rhythm. Through interaction, learners must decode and construct meaningful artifacts to represent their understanding. In today’s new media environment, this process of new media design involves such cognitive strategies as searching and selecting from ready-made modalities, selecting and matching combinations of modalities, mixing and transforming modalities, and compositing the modalities into seamless new media artifacts (Manovich, 2006). Each learning task thus focuses on problems and challenges developed around authentic situations, and learners must learn to express themselves within the context of the discipline knowledge. For example, language and literacy in the classroom have become a research focus in science education. Investigations into the multimodalities of teaching and learning science (Kress, Jewitt, Ogborn, & Tsatsarelis, 2001) show that, along with the written and spoken word, communication modalities at work include gesture, body language, eye contact, and movement, as well as other digitally-mediated forms. Traditional forms of learners’ collaboration do not extend much further than printed text. Our students need to participate in collaborative open content systems, and to become familiar with notions of distributed creativity—especially in the current environment where information, knowledge, and creative industries are accounting for an increasingly larger share of the economy in most Western nations (Jenkins, 2006). To be a meaningful participant in such a knowledge culture, students must acquire greater skills at assessing the reliability of information, which may come from multiple sources, some governed by traditional gatekeepers, others must be crosschecked and vetted within a collective intelligence (Jenkins, 2006). Contemporary creativity may no longer be focused towards creating original content,

but is a practice of rip, mix, and burn, where content is taken, appropriated, adapted, mixed, and distributed in a way in which consumption of media and information becomes a productive act of remixing, transformations, and creation of mash-ups of content from various sources.

Not only is collaboration key to this networked world but the form of discourse is also changing. Bereiter and Scardamalia (2005) contrast the concept of dialogue with discussion:

Discussion is aimed at settling differences, whereas dialogue is aimed at advancing beyond the participants' initial states of knowledge and belief. . . . Dialogue is purposeful, but it does not have a fixed goal. The goal evolves or emerges as the dialogue proceeds. Ability to sustain this open-ended yet goal-directed character would seem to be a hallmark of dialogic literacy. (pp. 12–13)

In relation to this distinction between discussion and dialogue, Bereiter and Scardamalia make a distinction between *belief mode* and *design mode* in how ideas are treated. "In belief mode, the concern is with truth, evidence, and coherence. Rational argument is the preferred form of discourse in belief mode. In design mode, the concern is the usefulness and improvability of ideas" (p. 13). The development of reason has long been an important aim for education (Wegerif, 2005). The situational specific nature of the students' learning, and the narrowness of their previous knowledge, both conspire to lead children to conclusions that focus on the particular, rather than the general and more fundamental, aspects of the activity. The problem is, perhaps, that models of reasoning have often been *monological*—seeking to reduce every difference to a single truth perspective—although the reality of reason in human affairs is *dialogical*—requiring the interlinking of two or more perspectives (Linell, 1998; Rommetveit, 1992). It is only in attempting to reformulate and express their ideas that learners come to realize the inadequacy of them. For these reasons, activities that encourage a true sharing of ideas are likely to be a fruitful way of encouraging children to test out their assumptions

and develop their thinking and reasoning (Mercer & Fisher, 1997).

New media technologies thus offer us new ways of communicating, and dialogue takes on novel forms (Mercer, Wegerif, Dawes, & Sams, in press). The forms of dialogue found in e-mail, computer conferencing, texting with mobile phones, social networking, and in virtual worlds reflect both the nature of these technologies and the purposes to which people apply them. For example, in the virtual world *Second Life*, communication tools include chat, instant messaging, and voice, and these can be used interactively and collaboratively to construct shared artifacts.

Spaces and Places for Knowing

Since its origin as a monochromatic text-based collection of hyperlinked pages, the World Wide Web (Web) has evolved into a multimodal visual and aural experience. The techniques of previously separate media have been united in common environment: videography, graphics, still images, animation, sound, and typography. The manipulation and construction requires a knowledge of visual, aural, and interactive conventions (Manovich, 2006). The term *Web 2.0* is used as a metaphor for a number of technological possibilities that have emerged as Internet applications. These functions support communities and collaboration, together with manipulation and sharing, rather than simply accessing information. Thus, the social software supported in Web 2.0 enables consumers to become producers. Learners can contribute to the resources and not just consume them. Technology-based teaching strategies can exploit a media-rich Web 2.0 to engage students and support them in working with ideas and making links between sources. Learners can add their own interpretations into Web 2.0 tools that enable modding of existing products and collation of multimodal information from multiple sources through mashing.

Learners' relationships with ideas can be determined by the context, and each change in context can result in the ideas being reworked to meet the particular need. Thus, the same idea might change its modality of representation and

its structure at different times in different places (Siemens, 2006). Authentic learning spaces have been variously defined to include: the provision of context and the ways knowledge is used in real life; activities that are ill-defined, complex, and completed over sustained time; expert performance that can be modeled; multiple roles and perspectives required; collaborative constructions of knowledge facilitated; and spaces might employ visual and aural cues, and emphasise processes such as reflection (Herrington & Herrington, 2006). Thus, we are working in spaces that are more complex and rely on meaningful artifacts that are interpreted and constructed, and that can be variously interpreted through different frameworks to produce different understandings from what might be seen as a common starting point.

The spaces of knowing are changing; no longer are learners constrained by institutional boundaries, but they can explore in virtual and cross-cultural settings (Owen, Grant, Sayers, & Facer, 2006). Weinberger (2006) uses an analogy that describes knowledge as no longer being organized as trees, but as a pile of leaves. Weinberger questions whether the knowledge structure has been determined by previous technologies, such as organizing things on paper. He suggests that the organization of knowledge in digital forms allows the same knowledge to be organized by many people in many ways through different digital constructions. However, he does admit that expert construction of ontologies and taxonomies is important for novices in a particular domain.

Social Software

The new media literacies should be seen as social skills, as ways of interacting within a larger community, and not simply an individualized skill to be used for personal expression. (Jenkins, 2006, p. 21)

The rapid expansion of participatory the Internet technologies of information access, knowledge exchange, and content production has supported a user-led production of content (Bruns,

2006; Jenkins, 2006). The existence of blogging, wikis, and other collaborative tools like YouTube and MySpace indicate that:

There is now an ongoing shift from production/consumption-based mass media, which produce a vision of society for us to consume as relatively passive audiences, to “produsage-based” personal media, where users are active producers of a shared understanding of society which is open for others to participate in, to develop and challenge, and thus to continually co-create. (Bruns & Jacobs, 2006, p. 5)¹

With the collaborative nature of many of these applications, the term *social software* is frequently used in conjunction with Web 2.0, and, more recently, the term *community plumbing* has also been used. The most familiar and popular ones are Internet discussion forums, social networking, and dating sites. However, applications like massive multiplayer online games and Internet messaging can also be seen as social software, as could group e-mails and tele-conferencing. At the same time, there are other technologies that enrich and enhance these practices, like syndication systems (such as Really Simple Syndication, RSS, a Web content syndication format) that monitor information in an organized way and aggregate changes for review. New collaboration tools are also emerging, where people can cocreate new content forms with no constraint on the modality of the contribution. The shared information resource might be a simple podcast but it might also be a complex mash-up of many sources from several sites. The combination of the technological affordances of social software with new educational agendas and priorities offers the potential for radical and transformational shifts in educational practice with the potential to create *disruptive pedagogies* where knowledge, its form of representation, and its manipulation cannot be undertaken without the use of digital technologies (Hedberg, 2006).

Disruptive Pedagogies

Should we realistically expect that information and communication technologies (ICTs) would

make a major difference in most teaching and learning contexts? Christensen (1997) coined the term *disruptive innovation* for contexts where the innovation or technology eventually takes over an existing dominant technology, even though it is radically different from it and, often, initially performs worse than previous dominant technology on existing measures of performance. Consider the role of ICTs in learning spaces. Over the past 30 years, the classroom has been invaded from time to time with different communications technologies. Each time promises have been made for increasing the authenticity of the learning experience or increasing the efficiency. However, since the time of the invention of the textbook in the 16th century, when it was claimed that it heralded the demise of Aristotelian dialogue (Ong, 2005), the classroom as a learning space has withstood the onslaught.

A more recent example demonstrates the interaction between pedagogy and use of ICTs. In many modern classrooms, interactive whiteboards² have been employed to present ideas and incorporate resources from outside the classroom through the Web. Their increasing use appears largely due to the fact that, unlike other previous invaders into the classroom, these do not appear on the surface to be too threatening. In fact their function, at least superficially, is very similar to the whiteboards of a few years and ago and even to the more historical chalkboards. Classrooms with these technologies still have groups of learners, and the teacher is still the locus of control. However, several studies³ about their use have shown the students to be actively controlling what is seen and explored. In fact, with increasingly linked classrooms, a simple discussion about what the climate is like today in another part of the world is a simple click away. This immediacy and the richness of the visual has changed the experience in ways that make the learning appropriate to the task and the range of interests of the group of learners. The interactive whiteboard, thus, increases the impact of the outside on the learning space and increases the relevance and multiplicity of modes of representation, because it has all of the computers' visual functions. With the power of the computer

to transduce between representations, we have a space that caters to different learning styles and needs. The interactive whiteboard enables ideas to be represented quickly and manipulated using the affordances of these new tools.

The new Web tools add extra value to the range of resources that can be accessed from the individual learning space. Several sites mash up other sites to create a richer and more visually representative set of information. Consider the site www.weatherbonk.com, where information is combined from several sources, Google Earth maps, cameras that individuals have linked to the web, and local meteorological services, to produce a rich set of multimodal data on different world cities.

ICTs and the Web have enabled the curriculum of the educational institution to be more efficiently recorded and transmitted to learners in many different contexts. It has encouraged many students and teachers to change their daily meeting times and places. It has enabled every institution to become a potential provider of distance learning. Students who still meet in formal classes may ask for many aspects of their course to be provided online so that they can combine a complex work and study schedule.

Dialogic Literacy Through Modding in Virtual Worlds

To provide some practical examples of the two processes, we draw upon examples of visually and aurally enhanced dialogic literacy employing two emerging social software. The first is *Second Life*, an Internet-based virtual world developed by Linden Lab. *Second Life* provides a downloadable client program that enables its users (residents) to interact with each other through motional avatars, providing an advanced level of social networking within a *metaverse* (a user-defined virtual world). Residents can explore, socialize, participate in individual and group activities, and create and trade items (virtual property) and services from one another. *Second Life* is one of several virtual worlds that have been inspired by the cyberpunk literary movement,

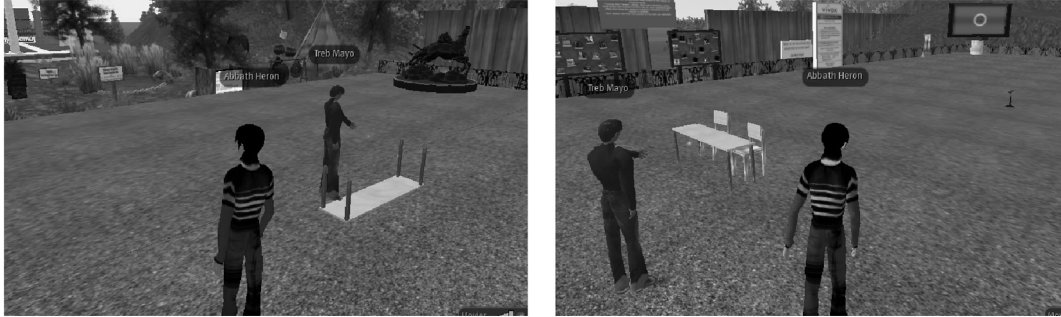


Figure 1. A Resident building table and chairs in *Second Life*.

and particularly by Stephenson's (1992) novel *Snow Crash*. The stated goal is to create a world like the Metaverse described by Stephenson, in which people can interact, play, do business, and otherwise communicate. Although *Second Life* is sometimes referred to as a game, it does not have points, winners or losers, or most of the other characteristics of games. However, it is a game-like environment in the sense that residents can play with concepts of self-representation and with alternative physics (Joseph, 2007).

In one sense, *Second Life* is a virtual environment with an advanced social modding interface. One of its distinguishing characteristics is the ability, as a resident, to construct potentially unlimited kinds of virtual objects or artifacts (e.g., buildings, vehicles, furniture, etc.), and modify, share, and trade them. Figure 1 shows a *Second Life* resident building a table with two chairs. Apart from working with geometry, size, and texture of the artifacts (3D modeling), the interface lets the resident attach scripts to the artifacts/objects when resident avatars interact with them. Within the virtual world, the resident can also negotiate on shared projects and can employ real-world-like communications with other residents; thus *Second Life* is an example of a social networking tool.

Artifacts and objects support and constrain the actions that can be taken. In many virtual environments (e.g., games), the artifacts/objects are part of the logic of the game design, and their actions are essentially fixed by the game devel-

opers. But in *Second Life* the users can attach behaviors to artifacts and objects, and thus plan for how resident avatars can interact or use them. Thus, they become a shared resource around which residents can negotiate (Gee, 2003). Outside *Second Life*, residents can use various visual, graphics, animation, and sound tools to create more elaborate multimedia items, and upload or stream them into the world. These multimedia items can then be embedded or combined with artifacts or objects. Thus, the dialogue is not limited to simple designer-determined representations or actions. The artifacts and objects created in *Second Life* become mediational means when appropriated into social practices (Scollon, 2001). For example, a group of students can collaboratively design and construct a building together by designing and constructing the many objects needed for the building—creating, modifying, and extending mediational means and affordances (mods).

Cross-functional teams, one form of collaboration encouraged by virtual worlds, was described by Gee (2003, cited in Joseph, 2007) as collaborations in which:

players form teams in which each player contributes a different set of skills. Each player must master a speciality . . . but the players must understand each other's specializations well enough to coordinate with one another. Thus, the knowledge needed . . . is distributed among a set of real people and their smart tools, much as in a modern science lab or high-tech workplace. (p. 13)

As an example, a design and construction group of students building a virtual hotel in *Second Life* could collaborate with a hotel management group of students preparing for the operation of the hotel. These virtual sites of engagement with two intersecting social worlds—building design/construction and hotel operation managers—set up a dialogical problem-solving habitus (Bourdieu, 1977). Agency will always be distributed among participants, mediational means, and discourses, and navigating this trajectory of sites of engagement essentially requires dialogic literacy while it also supports students' development of distributed creativity skills.

Second Life has emerged as a complex virtual environment, and for new learners and teachers it can be a daunting task to start to use the tools, and challenging to design and facilitate learning activities in-world. A sandbox is a popular place in *Second Life*, where residents often hang out and simply play by building things together. Learners develop skills in different orders and at different rates (Joseph, 2007). Some will be fascinated with their avatar, learning sophisticated ways to modify their shape or create clothing. Some will be drawn to build increasingly more sophisticated objects. Others will make friend after friend and learn how to manage the social network. For teachers, this can be a strength rather than a liability, by supporting the leadership skills of the early adapters who develop certain skills, encouraging them to help others and make that role as a peer resource visible. Teachers become facilitators and students peer mentors, supporting students' developing dialogic literacy through modding mediated by distributed knowledge and skills stratification.

Second Life is an emerging social network, similar to others like Friendsters and Facebook, in which individuals connect, forming networks of connections. There are several tools in *Second Life* for participating in the social network: join or create a group, send an instant message to get help from those logged in, send and receive group notices, add people to your friends list, etc. These tools can be used to publicize events, locate advice or help, or to educate teens on effectively using these networks. This supports

students' dialogic literacy through modding mediated by the social networking tools and social connections.

Dialogic Literacy through Social Annotation—Mashup

The new literacies almost all involve social skills developed through collaboration and networking. These skills build on the foundation of traditional literacy, research skills, technical skills, and critical analysis skills taught in the classroom. (Jenkins, 2006, p. 19)

Although the use of the Web in K–12 education has increased substantially in recent years, it does not support the learning processes of students as a matter of course. Kuiper, Volman, and Terwel (2005) analyzed the demands that the use of the Web as an information resource in education makes on the support and supervision of students' learning processes. The authors concluded that students need support in searching on the Web, as well as in developing information literacy. Sending students to the Internet to do their own inquiry does not guarantee meaningful learning (Molebash, 2004). The Internet, although powerful and convenient, erects significant barriers for students. Besides "information overload, low quality information, difficult reading levels, and distracting features," Internet information is also non-linear, dynamic, and uncontrolled (Eagleton & Guinee, 2002, p. 39).

Several recent studies have indicated the problems that students might have in an online inquiry process. For example, it is reported that students usually feel lost and frustrated when they use hypermedia environments, and thus fail to understand the topic (Land & Greene, 2000). Furthermore, the processes of inquiry in online environment, such as monitoring and evaluating Web information, require the students to be more cognitively and metacognitively aware, which may be beyond K–12 students' capabilities (Wegner, Holloway, & Garton, 1999). Hedberg and

Brudvik (2005) conducted a study on students' online inquiry behavior in lower middle-school science and history classrooms. The findings suggested that most of the students spent lots of time searching for irrelevant information, and using the information by merely copying and pasting what was closest to a correct answer. The study concluded that support is needed for:

1. Contextualizing: the process of pinning the settings given by the task, decomposing the task questions, recognizing the learning goals, and activating the prior knowledge;
2. Sourcing (rip): seeking information and selecting information. Students must be able to determine what keywords to use based on the task and their prior knowledge. They must have the ability to use various search strategies and to find a variety of potential sources of information. Students also must be able to determine the accuracy and relevance of search results and information sources. They must understand different points of view towards the task from millions of websites;
3. Constructing (mix and burn): support that enables the student to analyse the content in the source and synthesize information from multiple sources and enable the students to represent the answer appropriately using multiple modes of representation. (Hedberg & Brudvik, 2005, p. 2)
4. Monitoring and evaluation: Students must be able to judge the quality of the inquiry process and the product produced.

Diigo (www.diigo.com), a social content networking tool, is a second example of social software that has the potential to support the four information literacy skills outlined above and engage the students in dialogic literacy tasks. Diigo is a Web 2.0 application, a tool for collecting, sharing, and interacting on online information anywhere, and provides for social annotation. It provides features for searching, bookmarking and tagging, annotating, sharing of online resources, and engaging in group collaboration. Diigo offers a browser (Firefox, Internet Explorer, Flock) toolbar plug-in supporting these

features, and both an individual (My Diigo) and group online space (Group Diigo) for storing and sharing bookmarks and annotations. Even though they begin with text, the links and annotations are not constrained to that representational form. An example of visual and aural elements in a Diigo mashup is illustrated in the image to the left and the image to the right illustrates the social annotation of this mashup on the top of an original web resource, in this example from YouTube.

The Diigo toolbar search feature has several options to engage learners with accessing information at several places with the common search engines (Google, Yahoo, MSN, etc.) and online communities (blogs, social networks, etc). When you key in search terms in the toolbar, or when you highlight a word on any page, Diigo lets you:

1. search for the (highlighted) words on the Web with a range of search engines,
2. search for highlighted terms in social bookmarking systems,
3. do a blog search for highlighted terms,
4. search for your terms in the entire site you are on (Google, Yahoo, Ask site: search),
5. search for inbound links to the URL you are on in different search engines,
6. search for your highlighted terms in seven different verticals from local to TV to reference (e.g., encyclopedia) to stocks.

Diigo can also support the students' understanding and comprehension of information by highlighting search keywords in color every time they appear on the Web page. Within Diigo, the user can assign tags to the resource, type in a comment, choose to keep the bookmark private or public, and choose to share to a Diigo group. With the advent of social bookmarking, a Web-based service to share Internet bookmarks, bookmarks have become a means for users sharing similar interests to locate new Web sites that they might not know about, or to store their bookmarks so that they are not tied to a specific computer. Thus, a Diigo mashup can include the object clippings, multiple sticky notes, and comments for a tagged bookmark.

Social bookmarking has sprung mainly from academic roots, and a personal desire to share links and bookmarks with like-minded individuals. Collaborative bookmarking extends social bookmarking with the addition of project groups to allow users to collaborate across boundaries. Diigo provides a group feature for collaboration and sharing of bookmarks and annotations. A Diigo Group can be private or public. In a private group, the Diigo Mashups will only be accessible to the members of that particular group, whereas any Diigo user can access the public groups (Figure 2).

Dialogic Literacy—Organizing Knowledge in a Folksonomy

An emerging aspect of social software developing alongside online communities is the way that formal taxonomies and knowledge structures are giving way to *folksonomies*. Instead of a scholarly designed taxonomy, a folksonomy (a collection of tags defined by people in the community of interest) emerges spontaneously from members of the community. Simply by applying tags that make sense, using tools that allow commonly applied tags to float to the surface, the community develops its own sorting and ranking criteria for materials of interest. This provides

the basis for sharing digital resources in any form and providing links independent of formally classified systems.

Using Weinberger's (2006) knowledge analogy, creating a knowledge folksonomy creates meaning in a virtual space that otherwise would be a pile of leaves. Although the pile of leaves can be the vast number of digital information resources, the meaning structure emerges from the tagging of the social bookmarks. Take, for instance, the information available on the Web on causes of game addiction, a cross-disciplinary topic. Using Diigo Groups, students can collaboratively create a knowledge folksonomy for causes of game addiction. The students can individually work on the computer and share with a Group their bookmarks with tags, and thus collaboratively build their understanding of the topic by sorting and ranking their mashup of causes of game addiction (Figure 3).

The pile of leaves of Web resources on a topic like the causes of game addiction can be daunting for a K–12 student. Using social annotation support for students and teachers to interact *in-situ* on the leaves of knowledge supports the dialogical construction of places of meaning on top of Web pages. A group of students can use criteria for evaluating the web resources to support the process. For example, the students could evaluate the Web resources based on its

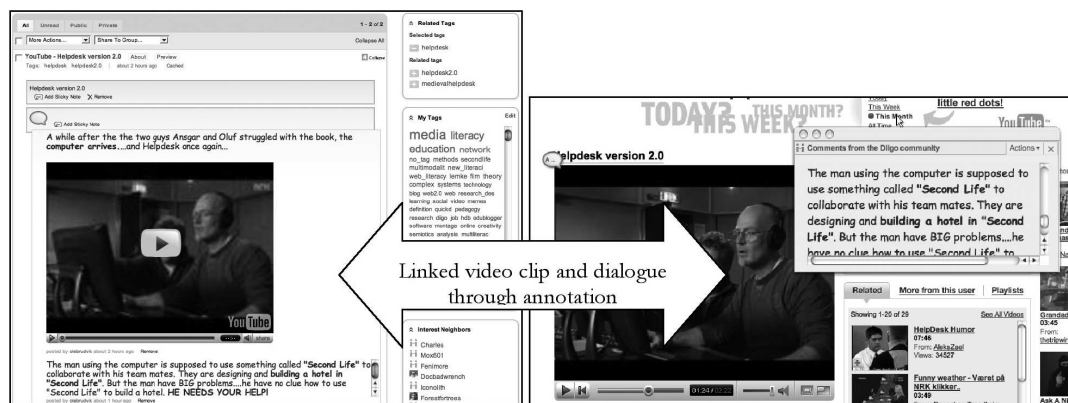


Figure 2. Diigo Multimodal Mashup. On the left is an example of visual and aural elements in a Diigo mashup. On the right the social annotation of this mashup on the top of an original Web resource.

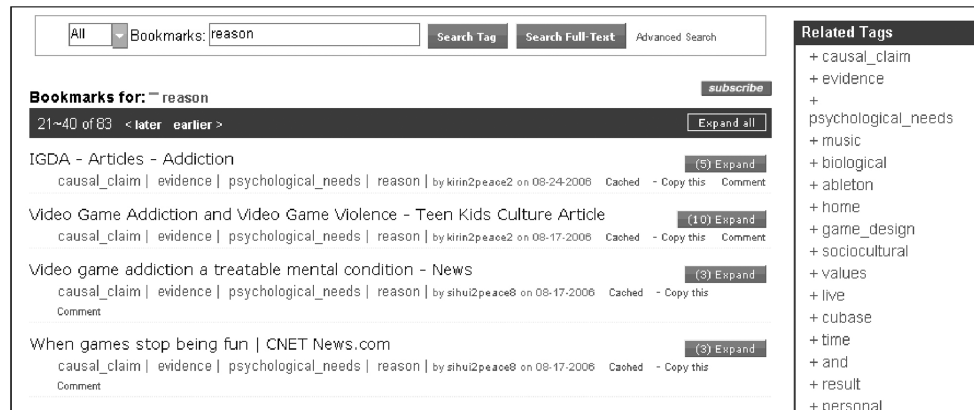


Figure 3. Diigo mash—Tagging/folksonomy.

typicality, sufficiency, accuracy, and relevancy, as well as by type of resource (from personal experience, statistical, etc.). Like most Web 2.0 tools, Diigo is equipped with Web feeds and, by using a feed reader, one can receive a notification of, and links to, individual or groups of learners new or updated mashup.

Conclusion

Although supporting the dialogical nature of knowledge building is potentially a powerful feature of social software, it can be overwhelming for one teacher to facilitate the increased interactivity of such a learning environment. A bombardment of student voices can be hard to manage in an online environment without the appropriate tools to manage it. This exploration has sought to identify the importance of dialogic literacy in the digital worlds that we are currently inhabiting. It has illustrated the increasingly varied ways in which we can use the new tools to construct artifacts and communications that are no longer limited to the traditional texts but, rather, require new modalities of representation. At this time, only small numbers are playing with these learning environments, but the examples we have chosen should point to some interesting challenges that we might address.

Notes

1. In Bruns and Jacobs (2006) terminology, producers “are users of collaborative environments who engage with content interchangeably in consumptive and productive modes: they carry out produsage” (p. 5).
2. Interactive Whiteboards are special whiteboards linked to a computer and a video projector so that interaction with computer software can also occur using touch contacts on the screen. Its main advantage is the links to resources and preorganized digital resources.
3. For examples, see the interactive whiteboard research site at <http://www.keele.ac.uk/depts/ed/iaw/>

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